

**PHASE SHIFTED TEST PATTERN FOR MONITORING FOCUS AND ABERRATIONS**  
**IN OPTICAL PROJECTION SYSTEMS**

***ABSTRACT***

5 A method is described for determining lens aberrations using  
a test reticle and a standard metrology tool. The method  
provides test patterns, preferably in the form of standard  
overlay metrology test patterns, that include blazed gratings  
having orientation and pitch selected to sample desired portions  
10 of the lens pupil. The method measures relative shifts in the  
imaged test patterns using standard metrology tools to provide  
both magnitude and sign of the aberrations. The metrology tools  
need not be modified if standard test patterns are used, but can  
be adapted to obtain additional information. The test reticles  
15 may be formed with multiple test patterns having a range of  
orientations and pitch in order to compute any desired order of  
lens aberration. Alternatively, single test patterns may be used  
to determine both the magnitude and sign of lower order lens  
aberrations, such as defocus or coma.